Route to:

Return to:

INSTITUTE OF GAS TECHNOLOGY

THE GAS INDUSTRY'S OWN EDUCATIONAL AND RESEARCH FACILITY

CHICAGO 16, ILLINOIS

GAS ABSTRACTS

VOLUME 6, NUMBER 10

OCTOBER, 1950

AFFILIATED WITH

ILLINOIS INSTITUTE OF TECHNOLOGY

CONTENTS

GAS ABSTRACTS is published and distributed monthly by the Institute of Gas Technology, Chicago 16, Illinois. The contents of selected papers and patents are reviewed impartially by the editorial staff and material of potential interest to the Gas Industry is presented. Subscription rates to non-members of the Institute: $15.00 per year.—Printed in the U.S.A.

1. GAS INDUSTRY

Rates

Mitchell, G. F. THE THERM RATE AND PROMOTIONAL RATES FOR NATURAL GAS. *Am. Gas J.* 173, 21-23, 46 (1950) *September.*

Companies planning to convert to natural or mixed gas distribution will find it advisable to change to a therm rate some months in advance of the conversion. Otherwise confusion arises in customers' minds when their rates per cubic foot increase even though the company explains that they are obtaining more heating units per dollar. Where underground storage fields are not available, companies must market their "valley" gas, preferably at as advantageous a price as possible to keep domestic rates down. Interruptible sales to large consumers and off-peak sales to smaller consumers may be secured through promotional rates. The cost of competitive fuels is an appropriate measure of interruptible and off-peak rates.

J. C. Lane

2. APPLIANCES

Burners

Cerny, J. A. and Green, N. B. (assigned to Affiliated Gas Equipment, Inc.) SAFETY CONTROL AND PILOT INDICATOR MEANS FOR GAS BURNERS. U.S. 2,516,504 (1950) July 25.

A signal lamp tied in a thermal indicating element circuit indicates when that element is hot. This will give the operator an indication, at any time, of flame on either pilot or main burner without visual observation of the interior of the appliance.

D. L. Nicol

Dufour, R. J. GAS RANGE TESTING PLATE. U.S. 2,519,237 (1950) August 15.

A simple device is presented that determines the efficiency of a gas range burner. A plate simulating the bottom of a cooking utensil is placed on the grill above the burner. Small apertures in the plate allow the products of combustion to mix with excess air at the top of the plate. The gases flowing through these apertures will burn if the products of combustion contain unburned gases. Therefore, the air-gas ratio is adjusted until the flame disappears below the surface of the testing plate. A salt solution may be used, coated on the aperture, to better define the flame.

D. L. Nicol

RESEARCH IN PILOT BURNER DESIGN, CONSTRUCTION AND PERFORMANCE. First Bulletin. Factors of Design Affecting Primary Air Injection and Flame Characteristics. Project DGR-5-B. American Gas Association Laboratories Research Bulletin 57 (1950) July.

Studies were conducted on 55 special pilot burner parts assembled to form pilot burners simulating contemporary designs, variations in heads, mixer tubes, and primary air openings. Data indicate that design principles for large burners are generally applicable to pilot burners. Positioning of the pilot burner is of primary importance insofar as maximum air injection is concerned. On non-aerated pilot burners, recessing the port increases flue stability.

D. L. Nicol

Controls

Taylor, F. M. H. THE UTILIZATION OF GAS AND COKE. Inst. Gas Engrs. (British) Communication 368 (1949) June.

As the fuel problem in Great Britain increases, the author points out the need to increase the use of gas and coke as fuels. With these fuels and use of automatic controls, economy of fuel and labor is obtained. In particular with regard to coke, development of appliances suitable to all grades of coke is necessary. A detailed outline of the most recent developments on automatic controls on gas fired appliances is given with emphasis on safety of operation.

D. L. Nicol

Vents

INSTALLATION OF OVAL VENTS. *Gas* 26, 37 (1950) *August.*

The Pacific Coast Gas Association recommends the following for "in the wall" vents: (1) a double walled metal vent pipe, or (2) a single vent with a metal shield between studs with the ceiling plate left open. Complete description and performance data are given.

E. F. Davis

Water Heating

Andrew, L. W. and Purkis, C. H. GAS WATER HEATING: THE CONTRIBUTION OF TESTING TO DESIGN. Inst. Gas Engrs. (British) Communication 369 (1949) June.

The value and limitations of standard tests are considered. These tests prevent sub-standard appliances from appearing on the market, but by the very limiting standard setup, the appliances are not improved much beyond these standards. Particular emphasis is put upon the environmental effects of installation on safety and efficiency.

D. L. Nicol

3. COMBUSTION AND INDUSTRIAL FURNACES

Flame Studies

Ashforth, G. K., Long, R. and Garner, F. H. DETERMINATION OF BURNING VELOCITIES FROM SHADOW AND DIRECT PHOTOGRAPHS OF A FLAME. *J. Chem. Phys.* 18, 1112-1113 (1950) *August.*

The apparent burning velocities of a stoichiometric *n*-heptane-air flame has been measured by the angle method over the entire diameter of the flame on both the shadow cone and the luminous cone. The authors claim that only at the intersection of these two curves is the relationship $V_B = U \sin \alpha$ valid for all three cones, shadow, luminous and imaginary. And that this point is the correct measurement of flame velocity for the particular flame.

D. L. Nicol

Friedman, R. and Johnston, W. C. THE WALL-QUENCHING OF LAMINAR PROPANE FLAMES AS A FUNCTION OF PRESSURE, TEMPERATURE, AND AIR-FUEL RATIO. *J. Applied Physics* 21, 791-795 (1950) *August.*

Data has been presented on the quenching distance between copper plates for a range of pressures 0.0832 to 2.77 atm and air-propane ratios ranging from 11 to 24. In other tests at atmospheric pressure the variables were: (a) temperature of plates ranged 80° to 715°F, (b) temperature of both gas and plates ranged 80° to 545°F (c) six different solid surfaces were tested. Minimum quenching distance was found at an air-propane ratio between 13.5 and 14.0 and is proportional to the minus 0.91 power of pressure. On tests with both gas and plates preheated, minimum quenching distance is proportional to the minus 0.5 power of absolute temperature. The quenching effect appears to be independent of the nature of the surface.

D. L. Nicol

Thring, M. W. RESEARCH ON FLAME RADIATION—THE PLAN OF AN ATTEMPT TO FILL IN AN IMPORTANT GAP IN FUEL TECHNOLOGY. *Fuel* (British) 29, 173-177 (1950) *August.*

A progress report is presented on the international experimentation on a large scale furnace to determine the variables and their effects on the luminous radiation of flames. Variables thus far investigated are (a) type of fuel, (b) quantity of fuel, (c) atomizing agent, (d) ratios of atomizing agent to fuel, (e) ratio of fuel to air. Future investigations will cover four fundamental factors which govern the luminosity of liquid fuel flame, which are: the fuel, droplet size, mixing history and heat loss history.

D. L. Nicol

4. CARBONIZATION AND GASIFICATION

Carbureted Water Gas

Gibson, J. W. USE OF HEAVY OILS IN C.W.G. PRACTICE. *Gas World* (British) 132, 182-183 (1950) *August* 12.

A modification of the C.W.G. operating cycle is proposed in which the usual up-blast is split into an initial down-blast followed by the up-blast period. Air is directed through the base of the superheater and upward through the carburetor during the down-blast period. This procedure permits the use of heavy oil for carburetion by removing troublesome carbon deposits from the base of the superheater and carburetor. Further advantages of the down-blast modification are (1) the air is preheated with resulting improvement in thermal efficiency and (2) the generator bed temperatures are more uniform, probably resulting in a higher steam decomposition and lower full consumption. The suggested time distribution of the cycle is

	% of total cycle time
Down-blast	10
Up-blast	30
Purge	5
First uprun	35
Backrun	15
Final uprun	5

Sample calculations anticipate that an increase in capacity of 11.3% over standard practice can be obtained.

C. Von Fredersdorff

Haug, J. S. (assigned to United Engineers & Constructors, Inc.) METHOD OF MAKING GAS. U.S. 2,505,894 (1950) May 2.

A continuous carbureted water gas generator is described which employs steam and oxygen in the blast. A suitable hydrocarbon fuel oil is injected into a pyrolizing zone which is heated in part by the generator gases and in part by the reactions of the oil with unreacted gases.

S. Katz

Coal Drying

Parry, V. S. and Wagner, E. O. DRYING FINE COAL IN THE ENTRAINED AND FLUIDIZED STATE. *Mining Eng.* 187, 974-982 (1950) *September*.

A summary is given of the Bureau of Mines work during 1949 on removal of internal moisture from low rank coals by processing them in the entrained or fluidized state. Coals of from 24 to 62% moisture from Colorado, Wyoming, Alaska, Texas and Greece were tested in 3 pilot plants. Hot gas (2000-2300 F) is jetted at velocities of about 80 fps into a drying column where it creates a fluidized or entrained mixture with the coal at a temperature of 290-450 F. This mixture moves upward to cyclone separators where the dried coal is deposited and the vaporized moisture is discharged. Up to 90% of the coal moisture can be removed without affecting the composition of the coal, with a degradation in average size of from 15 to 81% of the coals. Detailed operating data on processing of 7 coals and for calculating performance of larger units is given.

O. P. Brysch

Coal Quality

Roga, B. IMPROVEMENT OF COKE QUALITY IN POLAND. *Gas World* (British) *"Supplement"* 132, 77-81 (1950) *September* 2.

Because of insufficient output of coking coal in Poland to meet the demands of increased metallurgical industry, the following methods, in addition to those normally used in selection and preparation of coke-oven charges, have been adopted practically or tested experimentally for the improvement of coke: (1) choice of the best coal grades of certain mines and seams (crushing for coke-oven use of all sizes produced), (2) suitable blending of normal coking coals with other grades, (3) blending of excessively high-volatile caking coals with "leaning" substances (e.g. coke breeze, char), (4) blending with hard pitch or coal extracts, (5) stamping to produce denser coal charges, (6) alteration of the coking process to include semi-coking, stage-wise variations in rate of coking, briquetted charges, regulated slow cooling of coke.

O. P. Brysch

Coal Solvents

Dryden, I. G. C. BEHAVIOR OF BITUMINOUS COALS TOWARDS SOLVENTS. I. *Fuel* (British) 29, 197-207 (1950) *September*.

This is a selective review, designed by the author to provide a background for a current experimental program, to examine critically certain aspects of solvent extraction and to include the recent literature up to 1947. The survey emphasizes primarily the work on bituminous coals and the pyridine class of solvents. The older work (106 references) is grouped under the following headings: solvents used; industrial applications; influence upon degree of extraction of time, temperature, particle size, moisture, preheating, oxidation, physical and chemical properties of solvent, chemical interaction of solvents, mixed solvents; and influence of rank and petrological constitution of coal on degree of extraction and sorption.

O. P. Brysch

Coke Ovens

Van Ackeren, J. (assigned to Koppers Company, Inc.) BLEEDER DEVICE INTERCONNECTING WALL HEADERS OF COKE-OVEN UNDERFIRING SYSTEM. U.S. 2,516,-929 (1950) August 1.

In a waste-gas recirculation type battery, the suction in the off-burner line draws waste gases into the piping. Acidic constituents condense from the waste gas, and corrode the metal. To decrease the suction at the off-burner by supplying a limited quantity of fuel gas to the line, a bleeder is inserted between the lines leading to the burners on opposite sides of the battery.

W. E. Ball

Coke Research

Lowry, H. H. CARBONACEOUS PRODUCTS FROM COAL. *Chem. & Ind.* 1950, 619-625 (*August* 19).

The author reviews the recent work on coke research carried out in the Carnegie Institute Coal Research Laboratory. Statistical studies of the relationship of volatile hydrogen, oxygen, sulfur and nitrogen content of cokes to the temperature of carbonization and to the composition of coals are discussed with the aid of graphs. Relationship of the physical properties, such as true and apparent specific gravity, and the shatter and tumbler indexes, to the temperature of carbonization are more complex than that of the chemical properties. The inadequacy of the presently used shatter and tumbler indexes to express the *rate* of degradation is emphasized and more logical modified procedures of testing are described.

O. P. Brysch

Distribution

Ruff, C. L. HOW DETROIT INCREASED ITS DISTRIBUTION CAPACITY. *Gas Age* 106, 28-30, 62, 64, 66 (1950) *July* 6.

Detroit has increased its distribution system capacity to supply an additional 100,000 space heating customers. On the basis of an economic study it was decided to convert the system from 6 in. W.C. to a higher pressure system (½ to 5 psig depending on the load) and to install house regulators. In 1949, 86,500 house regulators were installed. Regulator package units were assembled on a production line basis. The method of installing the package units is described in detail. A no-relief type regulator with a vent to the outside was used. An average of 5 installations per man day was maintained. A leak survey was made at 3 points over every service. The total cost of the installation was $21.20 per unit converted.

O. T. Bloomer

PLANNING A CORROSION CONTROL PROGRAM. *Gas* 26, 80-84 (1950) *August*.

This is the first of a six-part symposium discussing the planning of a corrosion control program. The material reported was presented at the AGA Distribution Conference in April, 1950. The initial planning involved in establishing a corrosion control program is the subject covered in this installment.

B. E. Hunt

Gas Producer

Gumz, W. ASH FUSION GAS PRODUCER. *Gas J.* (British) 263, 291-292 (1950) *August* 9.

An abstract is presented of an original article by W. Gumz, appearing in *Gas und Wasserfach*, May 15, 1950. The ash fusion producer utilizes low grade fuels such as shale, high ash coke, and refuse clinker to produce gases of 115 to 300 Btu cu ft depending on the type of fuel, method of operation and oxygen enrichment of the blast. It has several advantages over conventional producers in that a much greater fuel throughput rate is possible and that the cost of the installation and labor required is low. For example with air-steam blast operation the gasification rate is 82 to 120 lb fuel sq ft hr which is two to three times the rate obtainable with mechanical grate producers. By oxygen enrichment of the blast a gasification rate exceeding 200 lb fuel sq ft hr is possible. The latter fuel rate may be trebled by operating under pressures of 20 atm. The ash fusion producer suffers from several disadvantages, namely: (1) excessive generator temperatures cause rapid deterioration of brickwork; (2) high exit temperatures and fuel loss as carry-over result in a decrease in thermal efficiency; and (3) to prevent excessive fuel carry-over a clean (screened) fuel charge is essential. Several producers utilizing oxygen-enriched blast, such as the Galocsy-Koller and Wurth types are discussed. The use of oxygen enrichment is not limited to ash fusion producers. Recovery and utilization of fuel dust in the make gas are mentioned. From the study the author concludes that the ash fusion producer is still in its infancy but possesses attractive features for water gas and synthesis gas operation.

C. Von Fredersdorff

Roberts, E. S., Rinckhoff, J. B. and Cunningham, F. C. (assigned to Chemical Construction Corporation) METHOD FOR THE PRODUCTION OF WATER GAS. U.S. 2,502,670 (1950) April 4.

A gas producer is described which may be used for the production of nitrogen free water gas. The method consists essentially of heating steam and recycled product gas in a pebble heater and reacting the mixture with coal, coke or lignite.

S. Katz

Gas-Synthesis Plant

GAS-SYNTHESIS PLANT. *Petroleum Processing* 5, 946-947 (1950) *September*.

The major construction work on the Bureau of Mines gas-synthesis plant at Louisiana, Missouri, has been completed. The integrated demonstration plant, when completed early next year, will produce 80 to 100 barrels per day of synthetic fuels. The plant consists of five major sections: (1) oxygen is produced in a 1 ton hr Linde-Frankl unit; (2) coal is gasified in a Koppers gasifier which is designed for 28 tons of coal, 24 tons of oxygen and 35 tons of superheated (2500 F) steam to produce about 2MMcf daily of raw synthesis gas. Since May, 1949, 45 tests of short duration have been made in this unit. A 7-ft diameter Kerpely producer operating continuously on coke and oxygen is also installed to provide synthesis gas if needed; (3) equipment to purify synthesis gas to a sulfur content of 0.1 grain per 100 cu ft is to be used; (4) synthesis will occur in a "jiggling bed" internally cooled converter; (5) the product recovery system will include wax separation, fractional distillation and catalytic reforming of the gasoline. Cost of the demonstration plant is $4,915,000.

C. H. Riesz

Gasification

Newman, L. L. and Donovan, J. T. (assigned to the United States of America as represented by the Secretary of the Interior) APPARATUS AND METHOD FOR GASIFYING CARBONACEOUS MATERIAL. U.S. 2,516,141 (1950) July 25.

Pulverized carbonaceous material mixed with oxygen is introduced through a plurality of nozzles into a vertical cylindrical chamber wherein the mixture undergoes partial combustion to form primarily carbon monoxide. Superheated steam, introduced tangentially below the pulverized fuel inlets, reacts with excess carbon present to form principally carbon monoxide and hydrogen and aids also in protecting the refractory walls of the chamber from excess temperatures and abrasion. Ash particles cooled by the steam drop into a water-cooled collecting hopper. The velocity of the gases produced is decreased by an expanded chamber above the reaction zone, thereby causing some entraineed excess carbon to drop back into the reaction zone, permitting more efficient utilization of the carbonaceous material.

C. Von Fredersdorff

Hydrogen from Propane

White, E. D. HOW LOOKOUT OIL GETS H_2 FOR ITS HYDROGENATION OPERATIONS. *Chem. Eng.* 57, 104-106 (1950) *September.*

A Girdler Hygirtol plant for producing hydrogen from propane was recently installed in the Lookout Oil and Refining Company refinery at Chattanooga, Tennessee. The plant designed for 150,000 cu ft per day of 99.7+% purity hydrogen is described briefly.

C. H. Riesz

Moisture in Coal

Rieber, A. F. MOISTURE IN COAL—IS IT ALWAYS BAD? HOW DO YOU MEASURE IT? *Power Eng.* 54, 66, 67, 106-108 (1950) *August.*

The author discusses the value of tempering or wetting of coals as practised in steam-raising plants, with special reference to Mid-Continent coals. Details of sampling and moisture determination for moist coals are given. The Dietert Moisture Teller and the Brabender moisture tester, both using the forced hot-air principle, are described and recommended for rapid moisture determinations in controlling boiler furnaces.

O. P. Brysch

Oil Gas

Henry, H. M. THE MANUFACTURE AND ECONOMICS OF OIL-GAS. *Gas Age* 106, 32-36, 66-67 (1950) *August* 17.

A summary of conversion costs for various types of high Btu oil gas processes and of holder costs for production of high Btu oil gas from light and heavy oils.

H. R. Linden

Stookey, K. W. HIGH BTU OIL GAS FITS PROGRAM FOR INTERIM USE AND STANDBY. *Am. Gas J.* 173, 18-20, 45-46 (1950) *August.*

The author presents a review of the economics of present high Btu oil gas operation and problems in producing high Btu oil gas as a natural gas substitute or supplement.

H. R. Linden

Purification

Williamson, R. H. and Garside, J. E. AN APPLICATION OF THE FLUIDIZED SOLIDS TECHNIQUE TO COAL GAS PURIFICATION. PART II. Inst. Gas Engrs. (British) Communication 357 (1949) November.

Continuous removal of H_2S by fluidized beds of iron oxide and the continuous regeneration of the oxide has been accomplished in laboratory-scale experiments with two-inch diameter reactors. Two processes are demonstrated, namely: (1) "Duplex" process in which H_2S is continuously removed in one fluidized bed and regenerated by oxidation with air in another, and (2) single stage process in which continuous H_2S removal and oxide regeneration occur in a single fluidized bed. The efficiency of H_2S removal was increased by operating two single stage reactors in series. Using iron oxide of approximately 150 mesh and space velocities over 100 times greater than prevailing in iron oxide boxes, it was shown that the H_2S content of a nitrogen stream could be reduced from 600 gr per 100 cu ft to virtually zero. Evidence is given for (1) a catalytic mechanism for the oxidation of H_2S, and (2) migration of sulfur toward the center and iron oxide toward the surface of the iron oxide particles.

C. Von Fredersdorff

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Belcher, R. and Spooner, C. E. A NEW METHOD FOR THE TITRIMETRIC DETERMINATION OF SULFUR IN COAL. p. 197

Schmidt, L. W. CALCULATING ANNUAL PEAK SHAVING REQUIREMENTS. p. 192

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Adsorption

Berg, C. H. O. (assigned to Union Oil Company of California) ADSORPTION PROCESS. U.S. 2,519,342 (1950) August 22.

The invention relates to the separation of gaseous mixtures by selective adsorption, and in particular to the more volatile hydrocarbons using granular charcoal. In the process described the adsorbant is in continuous downward movement in counterflow to the gas stream. There may be a cooling section in the upper part of the tower and a heated stripping section below the adsorption section. Use of "reflux" permits production of a side cut.

J. D. Parent

Berg, C. H. O. (assigned to Union Oil Company of California) ADSORPTION PROCESS AND APPARATUS. U.S. 2,519,343 (1950) August 22.

Selective adsorption is employed for separation of a gaseous mixture. There is counterflow of gas with a granular adsorbent moving down a column. An upper cooling section and a lower heated stripping section are provided. An overhead product is primarily the least adsorbable component while the bottom product is the more readily adsorbable component. For a multicomponent system fairly pure intermediate cuts as well as terminal products can be produced by means of one or more rectification sections in which portions of gas are recycled. Fractional distillation may be used for purification of the products.

J. D. Parent

Berg, C. H. O. (assigned to Union Oil Company of California) ADSORPTION PROCESS. U.S. 2,519,344 (1950) August 22.

The invention relates to the separation of gaseous mixtures by rectified absorption followed by selective adsorption on granular solids as practiced in the "hypersorption" process described in the patents previously issued to the inventor.

J. D. Parent

Compressor Station

Eichelmann, J. F. DESIGN & CONSTRUCTION OF A GAS-COMPRESSOR STATION. *Oil Gas J.* **49**, 203-205, 324, 326, 328, 330-331, 333 (1950) *September* 21.

Steps followed at El Paso Natural Gas Company for design of a compressor station are given. Details on accessories are included.

J. D. Parent

Compressors

Koenig, E. A. CENTRIFUGAL COMPRESSORS. *Gas Age* **106**, 28-30, 58 (1950) *September* 14.

Some performance data on centrifugal compressors used on the Texas Eastern line are presented.

J. D. Parent

Natural Gas Engines

Briley, C. B. FOR AUXILIARY BOOSTER STATION POWER: NATURAL GAS ENGINES. *Gas* **26**, 100, 101, 103 (1950) *September*.

Engines powered by natural gas are well suited for generation of power required for compressor station auxiliary equipment such as generators and air compressors. There are three generally accepted methods for selection of such units: (1) the Internal Combustion Engines Institute standards, (2) API standards, and (3) consideration of brake mean effective horsepower and piston speed. The methods are briefly reviewed. An allowance for altitude is suggested. Jacket water temperature is also discussed, the suggested ideal inlet temperature being 175 F and the preferred pickup being 10 F.

J. D. Parent

Natural Gasoline

Hutchinson, A. J. L. HEAT BALANCE OVER COOLING TOWER GIVES QUICK PERFORMANCE CHECK. *Petroleum Processing* **5**, 953-957 (1950) *September*.

The cooling tower is a vital spot in a natural gasoline plant. For the sake of efficiency calculations the author considers it as a piece of heat transfer equipment made up of theoretical trays. Heat balance equations are developed and performance graphs are constructed for ideal trays. Checks of performance against the curves indicate changes in tray efficiency and need for maintenance or repair before serious conditions which might require shutdown are developed.

J. D. Parent

Pryor, C. C. PRODUCT REQUIREMENTS DETERMINE THE COMPLEXITY OF GAS RECOVERY PROCESSES. *Petroleum Refiner* **29**, 204, 207-209, 212-214 (1950) *September*.

This is a resumé of processes used in natural gasoline plants. High propane recovery, rich oil deethanization, the fractionation-absorption process and product fractionation are included in the discussion.

J. D. Parent

Peak Shaving

Schmidt, L. W. CALCULATING ANNUAL PEAK SHAVING REQUIREMENTS. *Gas Age* **106**, 17-20 (1950) *August* 3.

A simplified graphical method is given for estimating peak shaving gas requirements. Sample calculations are made for straight natural gas and natural gas-air mixtures. The procedure for calculating natural gas peak shaving P, involves solving the equation

$$P = e(a - c) - f(a - b)$$

where a denotes maximum day sendout, b is the non-househeating average day sendout, c is the maximum daily natural gas supply and e and f are factors depending on the average daily temperature which can be evaluated for any locality. Peak shaving for the mixed gas case is estimated from the formula

$$P = e(wa - c) - f[w(a - b) + d - c]$$

where c denotes the base gas, exclusive of "modified" gas, on maximum day; d is the maximum theoretical base gas, exclusive of "modified" gas, on non-househeating average day; and w is the proportion of modified and other gas in sendout.

C. Von Fredersdorff

Petrochemicals

Van Winkle, M. PRODUCTION OF HYDROCARBON FEED STOCKS FOR PETROLEUM PROCESSES. *Petroleum Refiner* **29**, 226 (1950) *September*.

Production of petrochemicals in 1925 amounted to less than 150,000 lbs. while in 1946 it had reached 3.8 billion lbs. 5,500 different products are now produced from petroleum and natural gas. A table in which the raw materials and products are listed is presented for the more common petrochemicals. Processes used for production of feed stocks for petrochemical manufacture are briefly discussed.

J. D. Parent

Pipe Lines

Cowles, J. R. SURVEYING PIPE LINES FOR RECONDITIONING DATA. *Oil Gas J.* **49**, 270, 272-274 (1950) *September* 21.

The location of corroding sections of pipe line by the technique of "surface potential measurements" is discussed. The method consists essentially of measuring the magnitude and direction of potential difference between copper sulfate electrodes placed on the surface of the ground. Soil resistivity measurements are also necessary. Skilled interpretation of the data is necessary for its proper use. Variable soil resistivity, pipe depth, and pipe size are factors affecting the current flow.

B. E. Hunt

Kerr, D. J. CONCRETE-COATED PIPE USED FOR SWAMPS AND RIVERS. *Petroleum Engr.* **22D**, 19-22 (1950) *August*.

The rapid growth of the Gulf Coast as both a gas and oil producing area has emphasized the need of a coating suitable for pipe crossing marshy country, coastal area and rivers. A patented pipe coating consisting of a thick layer of concrete outside the pipe gives them a negative buoyancy and permanent corrosion protection. The coating procedure followed at the Gulf Coast Somastic plant of the H. C. Price Company is described.

B. E. Hunt

LaRock, T. B. HOW EL PASO LOWERS-IN PIPE WHEN USING SLACK LOOPS. *Gas* **26**, 89, 90, 92 (1950) *September*.

Slack loops are used by the El Paso Natural Gas Company at 1,000 ft intervals to compensate for the low ground temperature of the winter season. In rolling or rough country the frequency of the loops is less because the bends confer some flexibility. Installation procedure is described.

J. D. Parent

Moore, O. H. PRACTICAL APPLICATION OF LARGE-CLEARANCE COMPRESSOR CYLINDERS TO GAS-TRANSMISSION LINES. *Oil Gas J.* **49**, 219-220, 224, 358, 361 (1950) *September* 21.

Tennessee Gas and Transmission Company has adopted large diameter, large clearance cylinders in combination with clearance pockets. This is based on performance studies which are reported in terms of brake horsepower as a function of compression ratio for various conditions of clearance. Several types of engines were studied.

J. D. Parent

Parker, M. E. MAGNESIUM ANODES AND COMMON SENSE. *Petroleum Engr.* **22D**, 24-26 (1950) *August*.

The direct measurement of current requirements plus the sensible installation of the anodes will lessen and sometimes eliminate corrosion. The preferred procedure as outlined is to determine the current required, install one-third to one-half the estimated material, then measure the additional material required for complete protection. The proper distribution and installation of the anodes is stressed as being of primary importance.

B. E. Hunt

Stephenson, J. F. COST, AND SAVINGS EFFECTED BY CATHODIC PROTECTION FOR A SHORT SECTION OF LINE. *Oil Gas J.* **49**, 240-241 (1950) *September* 21.

A brief discussion is presented of the application of cathodic protection to several parallel pipelines located in low, marshy ground. This system has saved the concern $85,540 in the past ten years of service.

B. E. Hunt

11 STEPS IN PIPE-LINE CONSTRUCTION. *Oil Gas J.* **49**, 192-202 (1950) *September* 21.

Steps in pipe-line construction are listed and explained in some detail. Though simple, the article is well worth reading.

J. D. Parent

Production

Calhoun, J. C., Jr. ENGINEERING FUNDAMENTALS: SOLUTION—GAS-DRIVE PERFORMANCE AND OIL VISCOSITY. *Oil Gas J.* **49**, 111 (1950) *July* 20.

The effect of oil viscosity on the solution-gas-drive mechanisms of oil production from a reservoir is briefly outlined. It is shown that an increase in oil viscosity will increase the produced gas oil ratio and hence decrease the ultimate viscosity of oil by this mechanism.

O. T. Bloomer

Hopkins, W. B. PRINCIPAL FACTORS TO BE CONSIDERED PRIOR TO RECOMMENDING EXPENDITURE FOR WELL REMEDIAL WORK AND EVALUATION OF EXPECTED RESULTS. *Oil Gas J.* **49**, 69-72, 80 (1950) *August* 31.

The need for well remedial work should be recognized as soon as possible. Production and geological data are required. Excessive gas production may indicate need for remedial work or it may simply be dissolved gas. Some difficulties not associated with the reservoir itself are mechanical in nature such as plugged or cut screens. Others may be chemical such as deposition of wax or scale on tubing.

J. D. Parent

Horner, V. V. and Kimbrell, W. B. MUD CONTROL AND DESIGN. *Chem. Eng. Progress* **46**, 477-480 (1950) *September*.

A general discussion of the problems of drill-mud control is presented. The coverage is limited and no bibliography or extended explanations are given.

J. D. Parent

Kastrop, J. E. SELECTIVE ACIDIZING IN THE PERMIAN BASIN. *World Oil* **131**, 116-118, 122, 124 (1950) *September.*

Selective acidizing is fast becoming an exacting science and is common procedure in the Permian Basin. It is accounting for widespread increases in well productivity and is adding oil and gas reserves by providing the key to otherwise untapped sources of petroleum. The applications of selective treatment are discussed along with methods employed to isolate productive intervals in the pay zone.

Author's abstract

Rahmes, N. H. NORTH COWDEN, ONE OF NATION'S LARGEST GAS-INJECTION PROJECTS, NOW IN OPERATION. *Oil Gas J.* **49**, 74-76, 79, 104, 105 (1950) *July* 20.

This article presents a concise description with a flow diagram of the high pressure natural gasoline and injection plant which processes separator gas from the North Cowden field in West Texas. Present capacity is 50 MMcf per day and a total of 150,000 gal per day of propane, butane and natural gasoline are produced. Process features include monoethanolamine sweetening of the gas before the oil absorbers, oil absorption at 700 psig, solid desiccant dehydration of the residue gas and compression of the residue gas to 1,700 psig for injection.

O. T. Bloomer

Storage

HOW CONSOLIDATED NATURAL HANDLES UNDERGROUND STORAGE. *Gas Age* **106**, 23 (1950) *September* 14.

Some underground storage figures for the Consolidated Natural Gas Company as presented in a recent annual report of the company are briefly reviewed. A daily deliverability of 873 MMcf during 1949 is stated.

J. D. Parent

MAN-MADE RESERVOIR. *Oil Gas J.* **49**, 59-60 (1950) *August* 17.

Blanket salt beds suitable for underground storage are said to be widely distributed throughout the Southwest and Mid-Continent regions. In the Permian basin they are often 400 to 800 ft thick and lie 1,000 to 2,000 ft below the surface. In Keystone field a site was selected near the Sid Richardson gasoline plant and the storage cavern was leached out by water. About 1 barrel of storage area was made available for every 6 barrels of water used. When about 7,500 bbl of free volume was created 1,500 bbl of propane was placed on storage for testing completeness of recovery. 97 to 99% was recovered in two tests. Storage space cost is said to be $2.50 per bbl as opposed to $15 for steel tanks.

J. D. Parent

Sulfur

Girdler Corporation. SULFUR PRODUCED FROM HYDROGEN SULFIDE. *Petroleum Refiner* **29**, 225 (1950) *September.*

Hydrogen sulfide may be converted to elemental sulfur by oxidation of part of it to sulfur dioxide and by reacting this with the untreated material. This well known chemical reaction has been applied to the production of high quality sulfur from the acid gas stream from a Girbotol plant or its equivalent. The Girdler process is explained and a flow sheet given. Disposal nuisances are eliminated.

J. D. Parent

Tracer Studies

Frost, E. M., Jr. HELIUM TRACER-GAS STUDIES IN THE CABIN CREEK, WEST VIRGINIA OIL AND GAS FIELD. U.S. Bureau of Mines Report of Investigations 4715 (1950) August.

Three gas injection tests using helium as a tracer are reported for the Cabin Creek, West Virginia field. The gas normally contains about 0.035% helium and the injection helium content was maintained at 1% during the first test. The movement of the wave of injected gas through the reservoir was checked by analyzing gas samples from the producing wells. In the second test the helium content was 5%, while in the third test pure helium was used for a short time. Calculations were made to show average rates of gas travel through the reservoir.

J. D. Parent

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Ruff, C. L. HOW DETROIT INCREASED ITS DISTRIBUTION CAPACITY. p. 188

CORROSION ... p. 200

PLANNING A CORROSION CONTROL PROGRAM. p. 188

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Autothermic Cracking

Deanesly, R. M. AUTOTHERMIC CRACKING FOR ETHYLENE PRODUCTION. *Petroleum Refiner* 29, 217 (1950) *September.*

Autothermic cracking of ethane and propane can be used to provide ethylene. Efficient heat exchange between effluent gases leaving the cracking zone (at 1700-1800°F) and the air and hydrocarbon streams entering minimizes the amount of feed stock burned to provide the heat of cracking and heat losses. Yield of ethylene from ethane declines from around 0.8 moles per mole of ethane reacted at 50% conversion to around 0.6 moles at 90% conversion. The maximum concentration of ethylene (over 21%) in the product gas is obtained at about 80% conversion of ethane. Acetylene which is formed in small amounts may be destroyed by selective hydrogenation. A small amount of alkali is injected to neutralize traces of formic acid.

C. H. Riesz

Deanesly, R. M. and Watkins, C. H. PEAK LOAD GAS MANUFACTURE BY AUTOTHERMIC CRACKING. *Gas Age* **106**, 30-33, 53, 54 (1950) *August* 31.

The name autothermic cracking has been given to processes in which air or oxygen are introduced with the hydrocarbon so that the combined reactions of cracking and combustion are self-sustaining. Pilot plant data obtained primarily on propane are discussed. The process is characterized by effective transfer of heat from reactants to incoming charge materials so that thermal yields of 98% are possible. The reaction itself takes place at about 1900°F temperature with a residence time of from 0.02 to 0.10 seconds. Consideration of the gravity-heating value relationship of carrier gases produced leads to the conclusion that it is advantageous to operate near 100% conversion and then to enrich with propane to the desired heating value. This provides a minimum density of product gas. The process appears to offer advantages over propane-air for use as a supplementary gas when peak loads are required. A plant producing about 1.4 million standard cubic feet of unenriched 715 Btu autothermic gas has a capital cost of around $50 per thousand of rated capacity for unenriched gas. Larger plants will have a lower investment cost per unit of capacity. Other feed stocks ranging from natural gas to gasoline and kerosene can be used.

C. H. Riesz

Catalysts

Sensel, E. E. and Beck, R. A. (assigned to The Texas Company) CATALYSTS FOR HYDROCARBON SYNTHESIS. U.S. 2,517,035 (1950) August 1.

A lanthanum oxide-promoted cobalt catalyst is claimed for the synthesis of hydrocarbons. The following specific composition is claimed: 32% cobalt, 64% calcined diatomaceous earth, 3% magnesium oxide, 1% lanthanum oxide.

C. H. Riesz

Fischer-Tropsch Synthesis

Rees, H. V. (assigned to Texaco Development Corporation) PROCESS FOR SYNTHESIS OF HYDROCARBONS AND THE LIKE. U.S. 2,521,538 (1950) September 5.

Liquid products are synthesized from carbon monoxide and hydrogen by passing the synthesis gas through the walls of a vertical porous tube, the exterior of which is coated with a layer of catalyst. Control of the catalyst temperature is effected by flowing a liquid coolant down the catalyst tube exterior.

C. H. Riesz

Sensel, E. E. and Stewart, M. M. (assigned to The Texas Company) SUPPORTED CATALYSTS FOR THE CONVERSION OF CARBON MONOXIDE CONTAINING REACTANTS. U.S. 2,517,036 (1950) August 1.

An improved cobalt catalyst composition is claimed for the synthesis of hydrocarbons from carbon monoxide and hydrogen. The main feature is the use of a carrier comprising equal parts by weight of uncalcined diatomaceous earth and of alumina. The alumina contains less than 0.8% of alkali metal compounds, expressed on the basis of equivalent sodium oxide, and is stabilized with about 5% by weight of silica.

C. H. Riesz

Hydrogenation

Pelipetz, M. G., Weller, S. and Clark, E. L. HYDROGENATION AND PYROLYSIS OF ANTHRAXYLON FROM BITUMINOUS COAL. *Fuel* (British) 29, 208-211 (1950) *September.*

The hydrogenation and pyrolysis of bituminous coal anthraxylon was studied in batch autoclave experiments. Detailed elemental and material balances are given for eight tests. It is indicated that the major portion of hydrocarbon gases produced during normal coal hydrogenation is due to secondary processes occurring subsequent to the primary liquefaction. The bulk of the oxygen eliminated during hydrogenation appeared as water, but only small amounts of water were formed during pyrolysis in the absence of hydrogen. It is suggested that water is formed during hydrogenation by the reaction of oxygen-containing groups with molecular hydrogen rather than by the intramolecular splitting of water. The elimination of sulfur and especially of nitrogen proceeded more slowly than that of oxygen.

C. H. Riesz

Hydrogenation Plants

Nelson, G. A. METALS FOR HIGH-PRESSURE HYDROGENATION PLANTS. *Petroleum Refiner* 29, 104-110 (1950) *September.*

Ordinary carbon steel exposed to hydrogen at high pressures and elevated temperatures is damaged by decarburization and intergranular cracking. The damage is attributed to the reaction of iron carbide with hydrogen to form methane; this methane cannot diffuse out of the steel and the high stresses developed lead to granular cracking at the grain boundaries. Attack of the steel is prevented by the addition of any of the carbide-stabilizing elements; in ascending order of importance, these are: Mn, Mo, Cr, W, V, Ti and Cb. A graph based on industrial experience indicates the operating limits of temperature and hydrogen partial pressure for carbon and for alloy steels. Sulfur provides an additional problem for which general recommendations cannot be set. The iron sulfide scale formed may reduce further attack; in turbulent regions, the scale cannot form with consequent increase in corrosive attack. Nitrogen above 850 F and 2140 psi attacks austenitic stainless steels and steels containing more than 2% chromium. Nitriding to a depth of $^1/_{32}$-inch forms a hard, brittle case which appears to stop further attack. High pressure carbon monoxide is extremely corrosive to ordinary steels at temperatures of 300 to 650 F. Recommendations for use of steels in this region are shown in the form of graphs.

C. H. Riesz

Synthesis Gas

Garbo, P. W. (assigned to Hydrocarbon Research, Inc.) GENERATION OF SYNTHESIS GAS. U.S. 2,520,925 (1950) September 5.

Hydrocarbon gas and oxygen are each passed through spaced and opposed porous barriers into a generation space where reaction occurs at high temperatures to produce a mixture of hydrogen and carbon monoxide. The reaction pressure may be 200-300 psig and additional reactants including carbon dioxide and steam may be used.

C. H. Riesz

7. ANALYTICAL METHODS AND TESTS

Infrared-Mass Spectrometer Analysis

O'Neal, M. J., Jr. INFRARED-MASS SPECTROMETER COMBINATION METHOD FOR LIGHT HYDROCARBON ANALYSIS. *Anal. Chem.* 22, 991-995 (1950) *August.*

An analytical method for the determination of C_1 to C_4 paraffin-mono-olefin hydrocarbons is presented. Infrared and mass spectrometer data are combined resulting in a more accurate over-all analysis than with either instrument alone. Previous treatment of the sample is unnecessary.

D. V. Kniebes

Spectroscopy

Weber, G. SPECTROSCOPY EXPANDS USEFULNESS TO OIL INDUSTRY. *Oil Gas J.* **49**, 110, 113, 114 (1950) *August* 17.

A discussion of the various fields of spectroscopy and their present and possible future application to the oil industry is presented. Newer techniques such as microwave, neutron and x-ray spectroscopy are included as well as the more established mass, infrared, and ultraviolet spectroscopic methods.

D. V. Kniebes

Sulfur in Coal

Belcher, R., and Spooner, C. E. A NEW METHOD FOR THE TITRIMETRIC DETERMINATION OF SULFUR IN COAL. *Fuel* (British) **29**, 188-190 (1950) *August.*

Sulfur in coal may be determined in the combustion analysis for carbon and hydrogen by fixing the sulfur in a roll of silver gauze in the combustion tube. This gauze is then boiled in water, washed, and the filtered solution, acidified with HNO_3, is titrated with .05N potassium thiocyanate using ferric alum as indicator. Since other silver salts than sulfate (possibly pyrosulfate) are formed, an empirical factor is required to convert the silver thus titrated to sulfur in the sample.

(1 ml of 0.05N KSCN = 0.831 mg S.)

This factor applies to the range of sulfur contents of over 3%. Chlorine also may be determined turbidimetrically by subsequent extraction with 2N ammonia, although this method is time-consuming.

O. P. Brysch

Test Meter Method

Nowlin, R. F. TEST METER METHOD. *Gas* **26**, 37-40 (1950) *September.*

A detailed description is presented of the apparatus and method used for determining the specific gravity of gas and for determining the combined factor of specific gravity and specific heat ratio for use with critical flow provers. In essence, the test depends on determining the time required for gas and air to flow through an orifice. The specific gravity is obtained by running the test at a pressure of 10 in. w.c. and the combined factor is obtained by running the test at 19 psig.

W. J. Merwin

8. GENERAL AND PHYSICAL CHEMISTRY

Adsorption

Everett, D. H. THERMODYNAMICS OF ADSORPTION. PART I. GENERAL CONSIDERATIONS. *Trans. Faraday Soc.* (British) **46**, 453-459 (1950) *June.*

A thermodynamic approach to the study of the adsorption of gases on solid surfaces is presented. A procedure which parallels that used in the treatment of solutions is used.

S. Katz

Carbon-Hydrogen System

Szabo, Z. THE EXAMINATION OF A SYSTEM CARBON AND HYDROGEN IN THE TEMPERATURE RANGE 1100-2600°. *J. Am. Chem. Soc.* 72, 3497-3502 (1950) *August.*

The reactions of hydrogen with a heated carbon rod between 1100 and 2600° C have been studied. Methane, which is present at all temperatures passes through a concentration minimum at 1450° and a maximum at 2000°. Acetylene and ethylene appear above 2000. Above 1450, there is evidence of the formation of free CH, CH_2 and CH_3 radicals. These are probably intermediates in the high temperature formation of methane.

S. Katz

Thermal Diffusion

Whalley, E. and Winter, E. R. S. THE ELEMENTARY THEORY OF THERMAL DIFFUSION. *Trans. Faraday Soc.* (British) **46**, 517-526 (1950) *July.*

The extreme complexity of a rigorous analysis of transport phenomena in gases is cited in justification of the simplified treatment presented in this paper. A model has been set up, employing idealized elastic sphere molecules, and the results for thermal diffusion are somewhat similar to those obtained with the exact theory. An extension of the elementary theory to thermal diffusion in multicomponent systems is also given.

S. Katz

Thermodynamics

Kobe, K. A. and Pennington, R. E. THERMOCHEMISTRY FOR THE PETROCHEMICAL INDUSTRY. PART XIII—SOME OXYGENATED HYDROCARBONS, C_1 and C_2. *Petroleum Refiner* **29**, 135-138 (1950) *September.*

The thirteenth in the series of articles dealing with the compounds useful in the petroleum industry has to do with the oxygenated hydrocarbons. As previously, the most reliable reference data, heats and free energies of formation, heats of combustion, the molar heat capacities and enthalpies on four different temperature scales, and the empirical heat capacities equations are tabulated.

S. Mori

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

FLAME STUDIES . . . p. 186

10. CHEMICAL ENGINEERING

Bubble Trays

Davies, J. A. BUBBLE TRAYS DESIGN AND LAYOUT. PART I. *Petroleum Refiner* **29**, 93-98 (1950) *August.*

This is the first of a two-part article on bubble tray design and layout. Part I deals with the mechanical details of bubble tray design. Among topics treated are: (1) materials of construction, (2) thermal expansion, (3) tray hold down, (4) tower roundness, (5) tray level, (6) tray support beams, (7) weep holes, (8) leakage, (9) dirt and scale, (10) accessibility, (11) inlet and drawoff arrangements, and (12) standardization.

O. T. Bloomer

Cooling Tower

Degler, H. E. PLANT AID: WATER AT TWO TEMPERATURES FROM THE SAME TOWER. *Petroleum Engr.* **22C**, 55 (1950) *September.*

There is a considerable variation in water temperature in a cross flow cooling tower. Some users are inserting a partition in the collecting basin in order to have water at two different temperatures from the same tower.

J. D. Parent

Diffusion

Babbitt, J. D. ON THE DIFFERENTIAL EQUATIONS OF DIFFUSION. *Can. J. Research, Sec. A* 28, 449-474 (1950) *July.*

The three basic laws, (1) the dynamical equation of motion, (2) the continuity equation, and (3) the equation of state, are applied to the solution of problems of diffusion. The field is subdivided into branches such as, flow of a fluid through porous media, inter-diffusion of two gases and condensation. The differential equations are set up for each case and in some cases solutions are presented.

R. E. Peck

Fluid-Solid Contacting

Gilliland, E. R. TECHNIQUES OF CONTACTING FLUIDS AND SOLIDS. *Can. Chem. Process Ind.* 34, 632-639 (1950) *August.*

The operation of fixed bed, moving bed, and fluidized bed reactors for contacting gases and solids are described. Until recently the major method of contacting gases and solids has been the fixed bed technique, utilizing relatively large solid (catalyst) particles. A modification of the fixed bed is the so-called moving bed in which a solid of relatively large particle size is added continuously at the top and withdrawn from the bottom. The most recent technique developed is the fluidized powder method, in which solid particles are set in motion by the frictional drag of the upward passing fluid. Although fixed beds can be simple mechanically, several disadvantages exist in that (1) it is not easy to add or remove the solid, (2) if alternating cycles are used in the operation, the purging and valving problems become cumbersome, and (3) the heat transfer characteristics are poor. The moving bed is preferable to a fixed bed from an operational standpoint, and it has the further advantage that the moving solid can be treated in a series of cycles. The fluidized solid technique has several advantages over the fixed and moving bed in that (1) rapid circulation of the solid is possible, (2) the solid serves as a heat transfer medium when circulated between two vessels, (3) rapid mixing in the bed produces a nearly uniform temperature distribution, and (4) heat transfer between solid, gas and vessel wall (if externally heated) is greatly improved. Further discussion is given on gas phase mixing, Stokes law compared to fluidization slip velocity, theoretical and experimental bed solids concentration, and the gasification of coal and distillation of oil shale as applicable to the fluidized technique.

C. Von Fredersdorff

Heat Transfer

Ordinanz, W. O. THE FLUX ALGEBRA: A NEW METHOD OF CALCULATING HEAT TRANSFER. *Power Eng.* 54, 62-65 (1950) *August.*

Basic rules of radiation between solid bodies are discussed, and relationships between fundamental radiation equations are shown. Application of the equations to the case of heat exchange between boiler tubes and furnace wall results in derivation of an expression for effective surface involving only tube diameter and spacing. For rapid approximation, the "string rule" is given. The methods given are limited to radiation between solid bodies and will not help in estimating radiation from the gases of combustion.

C. L. Tsaros

Unit Processes

CHEMICAL ENGINEERING UNIT PROCESSES. *Ind. Eng. Chem.* 42, 1639-1768 (1950) *September.*

The third annual Unit Process Review presents a selective coverage of the important literature appearing on different phases of unit processes that became available since the preparation of the 1949 review. The unit processes covered are kinetics and equilibria; alkylation; amination by reduction; ammonolysis; esterification; fermentation; Friedel-Crafts reactions; halogenation; hydration and hydrolysis; hydrogenation and hydrogenolysis; isomerization; nitration; oxidation; polymerization; pyrolysis of coal and shale; pyrolytic and catalytic decomposition of hydrocarbons; sulfonation; and other unit processes.

Prien, C. H. PYROLYSIS OF COAL AND SHALE. *Ind. Eng. Chem.* 42, 1731-1739 (1950) *September.*

This third annual review of the unit process, pyrolysis, covers the literature available since June, 1949. Coal and shale pyrolysis are each discussed under topical headings of general surveys, mechanism and kinetics, raw materials and properties, high and low temperature processes, products and byproducts, analyses and testing. A bibliography of 268 references is cited.

O. P. Brysch

Wilhelm, R. H. and Toner, R. K. KINETICS AND EQUILIBRIA. *Ind. Eng. Chem.* 42, 1644-1699 (1950) *September.*

The literature dealing with kinetics and equilibria during the past year has been reviewed.

Especial mention is made of the extensive literature dealing with catalysis. Another section deals with methods of setting up experimental investigation of kinetic phenomena. The influence of diffusion in chemical processes is also summarized. The section on thermodynamics and equilibria is confined to papers dealing with application to unit processes. Hydrocarbon synthesis and processing have been the subject of the most extensive treatment. A bibliography of 127 papers in kinetics and 25 papers in thermodynamics is included.

S. Katz

12. MATERIALS OF CONSTRUCTION

Corrosion

Clayton, D. and Thompson, M. C. THE NATURE AND SCOPE OF TEMPORARY CORROSION PREVENTIVES. *J. Inst. Petroleum* (British) 36, 423-428 (1950) *July.*

The various types of temporary corrosion preventives, soft film, hard film, and oil film materials, are described. The field of use, and the principal causes of failure are discussed for each type material. Questions arising from accelerated listing procedures are raised.

B. E. Hunt

Hoxeng, R. B. ELECTROCHEMICAL BEHAVIOR OF ZINC AND STEEL IN AQUEOUS MEDIA—PART II. *Corrosion* 6, 308-312 (1950) *September.*

The behavior of steel in most of the solutions tested was quite constant while the potential of the zinc was very dependent upon the solution composition. In non-aerated solutions the zinc was always anodic to steel. In aerated solutions bicarbonates and nitrates promote cathodic potentials whereas chlorides, sulfates, silicates, and calcium promote anodic potentials.

B. E. Hunt

Lauderbaugh, A. B. THE FUNDAMENTALS OF GALVANIC CORROSION. *Gas Age* 106, 20, 25, 58, 60 (1950) *August* 31.

This paper is a primer on galvanic corrosion. Illustrated examples of galvanic corrosion caused by various factors are given.

B. E. Hunt

Pourbaix, M. and Van Rysellberghe, P. AN ELECTROCHEMICAL MECHANISM OF CORROSION INHIBITION BY CHROMATES, NITRITES AND OTHER OXIDANTS. *Corrosion* 6, 313-315 (1950) *September.*

Corrosion inhibitors are classified as (1) surface conversion inhibitors, (2) adsorption inhibitors, and (3) diffusion inhibitors; and a brief analysis of the mechanism of each type is given. A possible electrochemical mechanism is examined. It is planned to attempt direct poraographic determinations of the inhibitors consumed.

B. E. Hunt

Corrosion Resistant Alloys

Fahrenwald, F. M. METALLURGY FOR HIGH TEMPERATURE—HIGH SULFUR PROCESS CONDITIONS. *Petroleum Engr.* 22C, 11-14, 16 (1950) *August.*

The history and various end uses of the nickel and chromium ferrous alloys is given. These alloys have been developed especially for their corrosion resistance and heat resistance at temperatures above 1000 F. Each of several commercial alloys are discussed as to their physical properties and best uses.

B. E. Hunt

13. NEW BOOKS

Thermodynamics

Rossini, F. D. CHEMICAL THERMODYNAMICS, New York, John Wiley & Sons, Inc., 1950.

This book, written by a master in the fields of experimental and theoretical thermodynamics, is a singularly lucid presentation of this subject. Basic concepts are introduced in a simple and straightforward manner with emphasis on the application of the principles of thermodynamics to real systems. The statistical methods of calculating thermodynamic functions is presented prior to a consideration of the Third Law, and is a summary of procedures used repeatedly in the author's published works. The latter part of the book deals with ideal solutions, real solutions, strong electrolytes, Debye-Hückel Theory and applications of the phase rule to polycomponent systems. A final section deals in detail with methods used in a variety of contemporary thermodynamic problems.

S. Katz

SERVICE TO READERS

Bibliographies and Literature Searches

The library will prepare bibliographies and make literature searches on a cost basis plus a fixed service charge. A comprehensive statement outlining the problem in detail must be presented with the request.

Photocopies

The library will furnish photostatic or microfilm copies of articles abstracted in GAS ABSTRACTS at cost.

Abstracts on Cards

Copies of any abstract in GAS ABSTRACTS on 5 x 8 cards will be supplied on request.

Periodicals Abstracted for GAS ABSTRACTS

American Gas Association Monthly
American Gas Journal
American Petroleum Institute Quarterly
American Society for Testing Materials Bulletin
Analytical Chemistry
Bituminous Coal Research
Blast Furnace and Steel Plant
British Abstracts
British Coal Utilization Research Association Monthly Bulletin
Butane-Propane News
California Oil World
Canadian Chemistry and Process Industries
Canadian Gas Journal
Canadian Journal of Research
Ceramic Age
Chemical Abstracts
Chemical and Engineering News
Chemical Engineering
Chemical Engineering Progress
Chemical Industries
Chemical Reviews
Chemistry and Industry
Coal Age
Coke and Gas
Combustion
Compressed Air
Construction Methods and Equipment
Corrosion
Engineers' Digest
Fuel Abstracts
Fuel in Science and Practice
Fueloil and Oil Heat
Gas
Gas Age
Gas and Oil Power
Gas Heat in Industry
Gas Journal
Gas Research Board Publications
Gas Times
Gas World
Heating and Ventilating
Heating, Piping and Air Conditioning
Industrial and Engineering Chemistry
Industrial Gas
Industrial Heating
Institution of Gas Engineers: Bulletins, Communications and Transactions
Instruments
Iron Age
Journal of the American Chemical Society
Journal of Applied Mechanics
Journal of Applied Physics
Journal of Chemical Education
Journal of Chemical Physics
Journal of the Chemical Society (London)
Journal of the Institute Fuel
Journal of the institute of Petroleum
Journal of Metals
Journal of Organic Chemistry
Journal of Petroleum Technology
Journal of Physical and Colloid Chemistry
Journal of Research National Bureau of Standards
Journal of Scientific Instruments and Physics in Industry
Journal of the Society of Chemical Industry
LP Gas
Materials and Methods
Mechanical Engineering
Mining Engineering
National Gas Bulletin of Australia
National Petroleum News
Nature
Nucleonics
Official Gazette of the U.S. Patent Office
Oil and Gas Journal
Operating Engineer
Petroleum
Petroleum Engineer
Petroleum Processing
Petroleum Refiner
Pipe Line News
Power
Power Engineering
Public Utilities Fortnightly
Refrigerating Engineering
Review of Scientific Instruments
Science
Southern Power and Industry
Steel
Transactions American Society of Mechanical Engineer
Transactions of the Faraday Society
U.S. Bureau of Mines Bulletins, Information Circular Reports of Investigations and Technical Papers
World Oil